



**IEEE
NANEC
2019**

9th IEEE INTERNATIONAL NANOELECTRONICS CONFERENCE

**Kuching, Malaysia
July 3-5, 2019**

ORGANIZED BY



IEEE Nanotechnology Chapter
IEEE Singapore Section

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***Welcome, Fellow Researchers, to Kuching, Sarawak,
and we present to you the 9th IEEE International
Nanoelectronics Conference!***

Nanotechnology is making its impact to our current technology and there are still many potential areas that are yet to be explored. There are those who will meet the opportunity proactively and others who will wait and be forced to be reactive in their response. This conference lets the participants see the opportunity, and the decision is with you to respond either proactively or reactively.

This is the 9th in a series of successful conferences initiated by the Nanotech Chapter of IEEE Singapore Section since 2006. In this edition here at Kuching, we have four excellent keynote speakers from Austria, Canada, Japan, and United Kingdom. We also have around 20 renowned invited speakers from all over the world to share their latest research work with you. This year, our delegates come from 15 different countries, including Algeria, Australia, Austria, Brazil, Canada, China, Denmark, France, Hong Kong, India, Japan, Malaysia, Singapore, Taiwan and the United Kingdom, arranged alphabetically. They are presenting their work in the area of nano-materials and low dimensional materials, carbon materials, nano-electronics and its applications, nano photonics, nano-medicine, MEMS/NEMS, characterization techniques for nanotechnology and reliability of nano-materials and nano-devices. There are also several equipment vendors on site to display their high end advanced equipment. There are also companies that seek opportunities to recruit good candidates. Authors of selected high quality papers from the conference proceeding will be invited to submit an extended version of their research work to be published in the International Journal of Nanotechnology, a SCI-indexed Journal.

This year, we have best papers and posters awards supported by the IEEE Nanotechnology Council. We also have a public talk on Nanotechnology to be given by a Senior Professor from the National University of Singapore (NUS), who is passionate in bringing nanotechnology education to the public.

In addition to a great program, there are numerous opportunities to connect with conference delegates from around the world. We will also visit the cultural village of Sarawak. We have arranged tour companies at our conference site and you are welcome to bring your family to join the tour program of Sarawak to touch the unique cultures of different tribes and experience the natural scenery that remains largely unperturbed.

Our committee has worked tirelessly to provide a great program for all of you and we sincerely invite your participation and attendance in all the sessions.

It is my humble hope that your visit is a wholesome experience. I am confident that you will enjoy the hospitality from the city of Kuching. Thank you again for choosing to attend the conference and for making our program as diverse and deep as we wanted it to be.

Enjoy the conference! Enjoy Kuching!



Professor Cher Ming Tan
General and Founding Chair
IEEE INEC
Chang Gung University
Taiwan

INEC Conference History

The 9 th INEC	July 3-5, 2019	Kuching, Malaysia
The 8 th INEC	January 3-5, 2018	Kuala Lumpur, Malaysia
The 7 th INEC	May 9-11, 2016	Chengdu, China
The 6 th INEC	July 28-31, 2014	Sapporo, Japan
The 5 th INEC	January 2-4, 2013	Singapore, Singapore
The 4 th INEC	June 21-24, 2011	Tao-Yuan, Taiwan
The 3 rd INEC	January 3-8, 2010	Hong Kong, China
The 2 nd INEC	March 24-27, 2008	Shanghai, China
The 1 st INEC	January 10-13, 2006	Singapore, Singapore

Organizing Committee

Conference Chairman

Prof. Cher Ming Tan
CReST, Chang Gung University, Taiwan

Organizing Chair

Prof. Suk Fun Chin
Universiti Malaysia Sarawak, Malaysia

Technical Program Chair

Prof. Nagarajan Raghavan
Singapore University of Technology and Design, Singapore

Technical Program Co-Chair(s)

Dr. Preetpal Singh
Ming Chi University of Technology, Taiwan

Dr. Udit Narula
Intel, Dalian, China

Local Arrangements Chair

Prof. Hong Siang Chua
Swinburne University of Technology, Sarawak, Malaysia

Finance Chair

Prof. Terence Wong Kin Shun
Nanyang Technological University, Singapore

Organization & Sponsorship Chair

Prof. Suk Fun Chin
University Malaysia Sarawak

Publication Chair

Prof. Malay Ranjan Tripathy
Amity University, Noida, India

Publicity Chair

Prof. Sing Muk Ng
Swinburne University of Technology, Sarawak, Malaysia

Secretary

Prof. Chung Yi Li
Chang Gung University, Taiwan

Conference Venue

Pullman Kuching Hotel
(<https://www.pullmankuching.com/>)



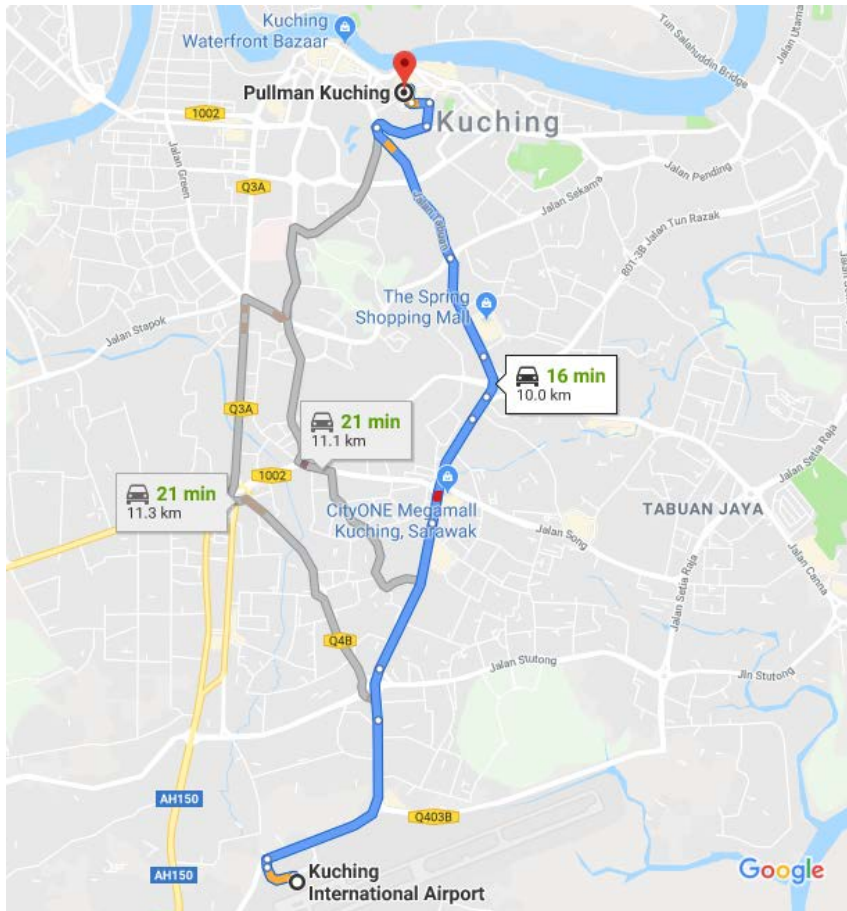
Please refer to the following link for more information on maps, directions, and transportation options to reach the hotel. (<https://www.pullmankuching.com/pullman-kuching/location/>)

Hotel Location:

Boasting several dining options and an outdoor pool, Pullman Kuching is set atop Hills Shopping Mall and is a 5-minute walk to Kuching Waterfront. Free Wi-Fi is accessible for all conference attendees. Guests staying in the hotel enjoy complimentary area shuttle service. Other facilities include a business center and currency exchange.

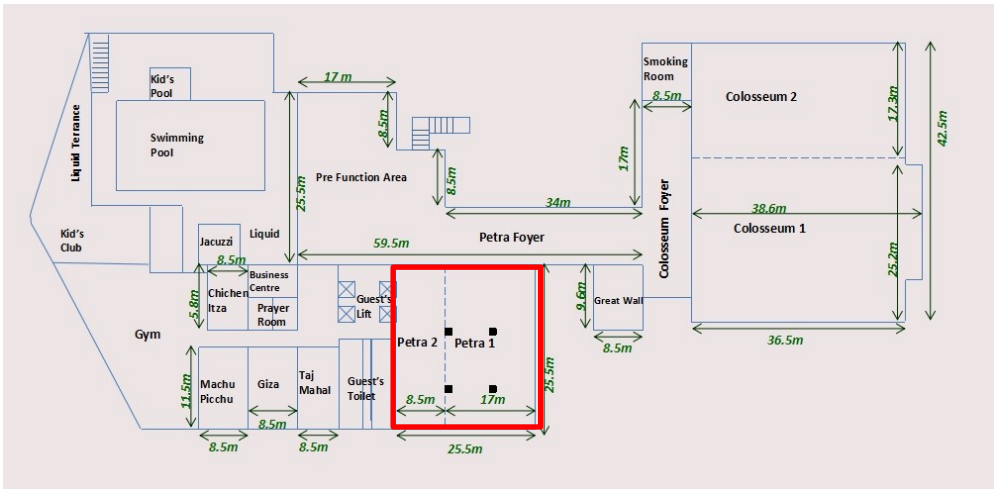
The Cat Statue is located 600 m from Pullman Kuching, while the Chinese History Museum is only 550 m away. Kuching International Airport is 10 km from the property. The best way to get from Kuching Airport (KCH) to Pullman Kuching without a car is to taxi which takes 10min and costs US\$ 12 - US\$ 15.

Kuching Map



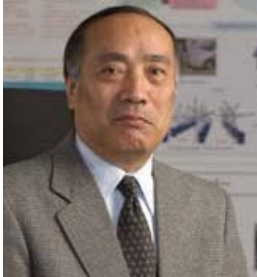


Venue Layout



Note: The conference rooms allotted for INEC 2019 are denoted by Petra 1 (P1) and Petra 2 (P2) in the Petra Foyer section.

Keynote Speakers



Dr. Morinobu Endo,

Distinguished Professor,
Shinshu University,
Director of Endo Special Laboratory at
The Institute of Carbon Science and
Technology &
Research Leader for Global Aqua
Innovation Center, Shinshu University
Date and Time: 9.20 - 10.20, 3rd July
(Wednesday)



Dr. Viktor Sverdlov

Professor,
Institute for Microelectronics,
Technische Universität Wien(TU Wien)
Vienna, Austria
Date and Time: 10.40 - 11.40, 3rd July
(Wednesday)

Dr. Federico Rosei



Professor and Director of Institut
National de la
Recherche Scientifique, Énergie,
Matériaux et Télécommunications

Université du Québec,
Varenes (QC) Canada

Date and Time: 11.40 - 12.40, 3rd July
(Wednesday)

Dr. Gehan Amaratunga



Professor,
Department of Engineering,
University of Cambridge, UK

Date and Time: 13.40 - 14.40, 3rd July
(Wednesday)

TECHNICAL PROGRAM SUMMARY

3 rd July 2019 (Wednesday)		
Venue: Ballroom 2 , Level 2		
07.30 – 08.30	Registration	
08.40 – 08.55	General Chair – Introduction to INEC 2019	
08.30 – 08.40	Speech by Guest of Honor	
08.55 – 09.10	Technical Chair – Overall Program Overview	
09.10 – 09.20	Housekeeping Speech	
09.20 – 10.20	Keynote I – Prof. Morinobu Endo, Shinshu University, Japan	
10.20 – 10.40	Morning Tea Break ☕	
10.40 – 11.40	Keynote II – Prof. Viktor Sverdlov, TU Wien, Austria	
11.40 – 12.40	Keynote III – Prof. Federico Rosei, University of Quebec, Canada	
12.40 – 13.40	Lunch 🍽️	
13.40 – 14.40	Keynote IV – Prof. Gehan Amaratunga, Univ. of Cambridge, UK	
14.40 – 15.05	Speech by Past Chair of IEEE EDS Malaysia Section	
	Petra 1	Petra 2
15.15 – 16.35	Nanomaterials I (WA 1-1 TO WA 1-4)	Nanoelectronics I/ Applications of Nanoelectronics I (WA 2-1 TO WA 2-3)
16.35 – 16.55	Tea Break ☕	
	Petra 1	Petra 2
16.55 – 18.30	Nanoelectronics 2 (WP 1-1 TO WP 1-4)	Nanophotonics I (WP 2-1 TO WP 2-4)

4th July 2019 (Thursday)

	Petra 1	Petra 2
8.30 – 10.20	Applications of Nanoelectronics 2 (TA 1-1 TO TA 1-6)	Applications of Nanoelectronics 3 (TA 2-1 TO TA 2-5)
10.30 – 10.50	Tea Break ☕	
10.50 – 12.25	Petra 1 Nanomaterials 3/ Nanophotonics 2 (TP 1-1 TO TP 1-2)	
12.25 – 13.30	Lunch Break 🍽️ + Poster Session	
	Petra 1	Petra 2
13.30 – 15.00	Reliability Testing/ Characterization techniques (TP 1-4 TO TP 1-7)	Nano Medicine / MEMS/NEMS I (TP 2-4 TO TP 2-6)
15.00 – 15.20	Tea Break ☕	
	Petra 2	
15.20 – 17.50	NEMS & MEMS-2 (FA 2-1 TO FA 2-5)	
	Petra 1	
16.45 – 17.25	Business Presentation by Conference Sponsors (SPS 1 to SPS 4)	
18.15 - 21.30	BANQUET	

5th July 2019 (Friday)

Swinburne University Auditorium	
9.30 – 11.30	Public Guest Lecture Prof. Sow Chong Haur Department of Physics National University of Singapore (NUS)

DETAILED TECHNICAL PROGRAM

DAY I: 3rd July 2019 (Wednesday)

07.30 – 08.30	Registration
08.30 – 08.40	Speech by Guest of Honor
08.40 – 08.55	General Chair – Introduction to INEC 2019
08.55 – 09.10	Technical Chair – Program Overview
09.10 – 09.20	Housekeeping Speech
09.20 – 10.20	<p style="text-align: center;">Keynote I Dr. Morinobu Endo, Distinguished Professor at Shinshu University, Director of Endo Special Laboratory at The Institute of Carbon Science and Technology, Research Leader for Global Aqua Innovation Center, Shinshu University Title: <i>Nanocarbons for environmental applications</i></p>
10.20 – 10.40	Morning Tea Break ☕
10.40 – 11.40	<p style="text-align: center;">Keynote II Dr. Viktor Sverdlov, Professor at the Institute for Microelectronics, Technische Universität Wien (TU Wien), Austria Title: <i>Spin-Based CMOS-Compatible Memories</i></p>
11.40 – 12.40	<p style="text-align: center;">Keynote III Dr. Federico Rosei, Professor and Director of Institut National de la Recherche Scientifique, Énergie, Matériaux et Télécommunications, Université du Québec, Varennes (QC) Canada Title: <i>Multifunctional Materials for Emerging Technologies</i></p>
12.40 – 13.40	Lunch 🍽️
13.40 – 14.40	<p style="text-align: center;">Keynote IV Dr. Gehan Amaratunga, Professor at Department of Engineering, University of Cambridge, UK Title: <i>Carbon Nanotubes and Silicon Nanowires for Photonics</i></p>
14.40 – 15.05	<p style="text-align: center;">Speech by Past Chair of IEEE EDS Malaysia Section Susthitha Menon Universiti Kebangsaan Malaysia, Malaysia</p>

**SESSION WISE DETAILED PROGRAM
DAY 1: 3rd July 2019 (Wednesday)**

Session WAI:**Nanomaterials I**

Venue: **Petra I**

Session Chairs: **Cher Ming Tan & Li Pei-Wen**

WAI-1
15.15 – 15.40
Invited

Nano-interconnects for VLSI: Challenges and Opportunities
Cher Ming Tan
Chang Gung University, Taiwan

WAI-2
15.40 – 16.05
Invited

Self-organized heterostructures of Ge nanodot/SiO₂/SiGe-recess channel enables high responsivity and high speed photoMOSFETs for Si Optical Interconnects
Li Pei-Wen
Nanoelectronics Center Director, NCTU, Taiwan

[WAI-3](#)
16.05 – 16.20

Photo-induced Electron Transfer from Hematite and Zinc Oxide Nanostructures to Cytochrome C: Systems Applicable to Spintronics(Paper ID 148)
Lucivaldo R. Menezes, David M. Lopes, Julia D. Bronzato, Guilherme Sombrio, Denise Criado, José A. Souza and Iseli Nantes
Federal University of ABC, Brazil

[WAI-4](#)
16.20 – 16.35

Effective Defect Screening of Integrated Large HV LDMOS Driver in Critical Automotive Application towards “Zero-Defects”(Paper ID 121)
Nur Izyan Bolhan, Madelyn Liew, Lydia Lim, Poh Ching Sim, Hao Yang and Alexander Holke
XFAB Sarawak Sdn. Bhd., Malaysia

Session WA2:**Nanophotonics I**

Venue: **Petra II**

Session Chairs: **Sow Chorng Haur**

WA2-1
15.15 – 15.40
Invited

A Focused Laser Beam as a Versatile Tool for Nanomaterials Research
Sow Chorng Haur
NUS, Singapore

[WA2-2](#)
15.40 – 15.55

In-Situ Real Time Observation of Sn-Rich Dots and Wires Evolution during Annealing of Compressively Strained GeSn Epitaxial films(Paper ID 133)
Sheau Wei Ong, Edwin Bin Leong Ong, Hway Chuan Kang and Eng Soon Tok
NUS, Singapore

[WA2-3](#)
15.55 – 16.10

OPTOELECTRONIC CHARACTERISTICS OF MONOLAYER TUNGSTEN DISULPHIDE BASED VISIBLE RANGE PHOTODETECTOR (Paper ID 145)
Haroon Rashid, Rizal Ramli and Harith Ahmad
University of Malaya, Malaysia

DAY 1: 3rd July 2019 (Wednesday)

Session WPI:**Nano Electronics 2**

Venue: **Petra I**

Session Chairs:**Shweta Agarwala&KS Chang-Liao**

WPI-1
16.55 – 17.20
Invited

Opportunities in Printed Electronics: Enabling 3D Printed Devices
Shweta Agarwala
Aarhus University, Denmark

WPI-2
17.20 – 17.45
Invited

High Performance Ge pMOSFET with Engineering Interfacial Layer
KS Chang-Liao
National Tsing-Hua University (NTHU), Hsinchu, Taiwan

[WPI-3](#)
17.45 - 18.00

Physical Insight into Self-heating Effects in Ultra-thin Junctionless Gate-All-Around FETs(Paper ID 107)
Arun Kumar, P S T N Srinivas and Pramod Kumar Tiwari
Indian Institute of Technology Patna, India

[WPI-4](#)
18.00 - 18.15

Effects of Lateral Spreading in 2-Dimensional Non-Uniform Doped JunctionlessFinFETs(Paper ID 108)
Arun Kumar, P S T N Srinivas and Pramod Kumar Tiwari
Indian Institute of Technology Patna, India

Session WP2:**Nanophotonics I**

Venue: **Petra II**

Session Chairs:**Siva Karuturi& Tomohiro Amemiya**

WP2-1
16.55 – 17.20
Invited

Advanced Semiconductor Materials for Solar Hydrogen Generation
Siva Karuturi
Australian National University (ANU), Canberra, Australia

WP2-2
17.20 – 17.45
Invited

Si-based Orbital Angular Momentum Mux/Demux Module
Tomohiro Amemiya
Tokyo Institute of Technology (TIT), Japan

[WP2-3](#)
17.45 - 18.00

ITO Islands as Floating Electrodes to Deposit Aligned Carbon Nanotubes Thin Films(Paper ID 113)
Abdullah Abdul Hameed
Universiti Putra Malaysia, Serdang, Malaysia

[WP2-4](#)
18.00 - 18.15

Low-cost SWIR silicon-based GO photodetector(Paper ID 120)
Rizal Ramli, Tan Chee Leong, Tamil Many K.Thandavam and Harith Ahmad
Photonics Research Center, University of Malaya, Malaysia

END OF DAY I

DAY 2: 4th July 2019 (Thursday)

Session TAI: **Applications of Nanoelectronics 2**
 Venue: **Petra I**
 Session Chairs: **Susthitha Menon & KS Chang-Liao**

TAI-1
08.30 – 08.55
Invited

Kretschmann-based Surface Plasmon Resonance for Sensing
Susthitha Menon
 Universiti Kebangsaan Malaysia, Malaysia

TAI-2
08.55 – 09.20
Invited

Engineering novel transistor-based chemical sensors
Gia Parish
 University of Western Australia, Perth, Australia

[TAI-3](#)
09.20 - 09.35

Electrical Model of Ta₂O₅/TaO_x RRAM device with current conduction beyond RESET Phase (Paper ID 128)
Arya Jagath, Nandha Kumar T and Haider Abbas
 University of Nottingham Malaysia campus, Malaysia

[TAI-4](#)
09.35 - 09.50

Optimization of Asymmetric π (Pi) Gate HEMT for Improved Reliability & Frequency Applications (Paper ID 132)
Khushwant Sehra, Vandana Kumari, Vandana Nath, Mridula Gupta and Manoj Saxena
 University School of Information, Communication & Technology (USIC&T), GGSIP University New Delhi, India

[TAI-5](#)
09.50 - 10.05

Stress Effect Of Wafer Fabrication BEOL Structures On Poly-Silicon: A Piezo-Electric Phenomenon (Paper ID 118)
Sanjay Shirang Mane, Raj Sekar Sethu, Lars Bergmann, Marco Erstling, Peter Dimitrovici, Angela Fahr, Philippe Trovati and Kok Heng Soon
 X-FAB Semiconductor Foundries AG, Malaysia

[TAI-6](#)
10.05 - 10.20

Integrated Zener diodes for smart power IC (Paper ID 126)
Madelyn Liew, Nur Izyan Bolhan, Lydia Lim, Poh Ching Sim, Hao Yang and Alexander Hoelke
 X-FAB Sarawak Sdn. Bhd., Malaysia

Session TA2: **Applications of Nanoelectronics 3**
 Venue: **Petra II**
 Session Chairs: **Hei Wong & Kelvin Ooi**

TA2-1
08.30 – 08.55
Invited

Surface Roughness of Subnanometer EOT Gate Dielectric and Its Effects on the Characteristic Variabilities of Nanoscale MOS Transistors
Hei Wong
 City University of Hong Kong (CUHK)

TA2-2
08.55 – 09.20
Invited

Universal description of electron injection in 2D-material-based electrical contact
Ang Yee Sin (Kelvin Ooi)
 SUTD, Singapore
 (Xiamen University, Selangor, Malaysia)

[TA2-3](#)
09.20 - 09.35

Voltage Scaling in Nanoscale Selector-less PrMnO₃ RRAM by N₂O₂ Partial Pressure Dependent Annealing(Paper ID 144)
Sandip Lashkare, JayatikaSakhuja and UdayanGanguly
 Indian Institute of Technology Bombay (IIT-B), India

[TA2-4](#)
09.35 - 09.50

CMOS nanoswitch for RF Frontend(Paper ID 149)
Mohammad ArifSobhanBhuiyan, Mamun Bin IbneReaz and Md Torikul Islam Badal
 Xiamen University, Selangor, Malaysia

[TA2-5](#)
09.50 - 10.05

Spatially mapping Work Function Changes and Defect Evolution in the Fluorination of Graphene (Paper ID 127)
Edwin Bin Leong Ong, Sheau Wei Ong, Bo Liu, Chao Sung Lai, Harman Johll, HwayChuan Kang and Eng Soon Tok
 NUS, Singapore

10.30 - 10.50

Morning Tea Break 

DAY 2: 4th July 2019 (Thursday)

Session TPI:**Nanomaterials 3/ Nanophotonics 2**
 Venue: **Petra I**
 Session Chairs: **Kelvin Ooi**

TPI-1
10.50 – 11.15
Invited

Dirac Optics in Three Dimensions
Kelvin Ooi
 Xiamen University
 Selangor, Malaysia

TPI-2
11.15 - 11.30

Development of a highly sensitive flexible tactile sensor array for three-dimensional force detection applications (Paper ID 106)
Xuguang Sun, Shuaikang Zheng, Chunkai Wang, Jianhai Sun and Ning Xue
 Institute of Electronics
 Chinese Academy of Science (CAS), China

12.25 - 13.20

Lunch Break  **+ Poster Session**

DAY 2: 4th July 2019 (Thursday)

Session TPI:**Reliability Testing/ Characterization**
 Venue: **Petra I**
 Session Chairs:**AdilMeersha& Ramesh Thamankar**

TPI-4
13.30 – 13.55
Invited

Road map for reliable Tera-Hertz electronics using Graphene
Adil Meersha
IISc, India

TPI-5
13.55 – 14.20
Invited

2-D materials, beyond classical electronics, towards quantum computation
Ramesh Thamankar
Vellore Institute of Technology
Vellore, Tamil Nadu, India

[TPI-6](#)
14.20 - 14.35

Wire Bondability Evaluation of Concave Bond Pad(Paper ID 110)
Kuan Fang Lee, Peter Dimitrovici and Hong Seng Ng
X-FAB, Sarawak, Malaysia

[TPI-7](#)
14.35 - 14.50

Dependence of test conditions on efficiency of Phosphor Quantum dots- based white LEDs(Paper ID 163)
Preetpal Singh, Cher Ming Tan, Hao- Chung Kuo and Kai Wang
Ming Chi University of Technology
New Taipei City, Taiwan

Session TP2:**Nano Medicine/ NEMS & MEMS**
Venue: **Petra II**
Session Chairs:**Samaresh Das &Théo Calais**

TP2-4
13.20 – 13.55
Invited

Sensitive Nanowire and Hetero-junction Photodetectors
Samaresh Das
Indian Institute of Technology (IIT), Delhi
New Delhi, India

TP2-5
13.55 – 14.20
Invited

DNA Self-Assembly for the Design of Advanced Functional Materials and Nanocomposites
Théo Calais
Singapore University of Technology and Design (SUTD)
Singapore

[TP2-6](#)
14.20 - 14.35

Electromagnetic propagation models in nerve fibers (Paper ID 103)
QingweiZhai, Kelvin Ooi, C K Ong and Shengyong Xu
Xiamen University
Serdang, Malaysia

14.50 - 15.20

Afternoon Tea Break 

DAY 2: 4th July 2019 (Thursday)

Session SPS:**Sponsor Session**
Venue: **Petra I**
Session Chairs:**Kelvin Ooi and Preetpal Singh**

SPS-I
16.45 – 16.55

Sponsor I
X-Fab
Sarawak, Malaysia



SPS-2
16.55 – 17.05

Sponsor 2
PVA TePla
Germany



SPS-3
17.05 – 17.15

Sponsor 3
CL Technology Co. Ltd.
Taiwan



SPS-4
17.15 – 17.25

Sponsor 4
JEOL (Malaysia) Sdn. Bhd.
Malaysia



DAY 2: 4th July 2019 (Thursday)

Session FA2:**NEMS& MEMS-2**

Venue: **Petra II**

Session Chair: **Shankar Kumar Selvaraja**

FA2-1
15.20 – 15.55
Invited

Silicon photonics based resonators for optical signal processing and sensing

Shankar Kumar Selvaraja

CeNSE, Indian Institute of Science (IISc), Bangalore, India

[FA2-2](#)
15.55 – 16.10

Pt/AIGaN/GaN HEMT based ammonia gas sensors (Paper ID 129)

Akhil Ranjan, Manvi Agrawal, K Radhakrishnan and Nethaji Dharmarasu

Nanyang Technological University (NTU), Singapore

[FA2-3](#)
16.10 – 16.25

Feasibility of Packaged Interferometric Photonics Microtaper Sensor for Cold Formed Steel Roof Truss Structural Health Monitoring (Paper ID 138)

Wui Liam Oon, Horng Sheng Lin, Chang Hong Pua, Jee Hock Lim, Siong Kang Lim and Faiz Abdul Rahman

Universiti Tunku Abdul Rahman (UTAR)

Negeri Perak, Malaysia

[FA2-4](#)
16.25 – 16.40

Dielectric enhancement of AlN based multiferroic via insertion of NiMnIn thin layer in AlN film (Paper ID 141)

Davinder Kaur, Shuvam Pawar and Anuj Kumar

Indian Institute of Technology Roorkee, India

[FA2-5](#)
16.40 – 16.55

Effects of 3D Profiles of Adjacent Trench Areas on Rule-Based Etch Bias Retargeting Accuracy for OPC (Paper ID 105)

Tamer Abdulrahman, Nayera Ahmed, Pabitra Das and Sebastien Daveau

X-FAB, France

18.00 – 20.30

Banquet Dinner
Sarawak Culture Village
Kuching

END OF DAY 2

DAY 3: 5th July 2019 (Friday)

Venue: Lecture Theater, Swinburne University of Technology, Sarawak

09.30 – 11.30

Public Guest Lecture
THE FASCINATING NANOWORLD
Prof. Sow Chorng Haur
Department of Physics
National University of Singapore (NUS)

END OF DAY 3